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ABSTRACT

A study examined current and alternate mechanisms for alloting federal vocational education funds to states. The approach to analysis was based on a conceptual framework of a range of policy choices that variously defined the federal role in vocational education. Within this framework factors indicative of states' needs for vocational education funds were indentified and converted to variables that were used to define possible new formulas. Criteria for evaluating current and alternate formulas were established and applied. They included equity, objectivity, adequacy, administrative efficiency, and flexibility. The advantages and disadvantages of each alternate formula were discussed relative to the evaluative criteria as well as total reallocated dollars and characteristics of states with a higher or lower expected allocation under an alternate formula than under the current formula. Computer simulations were conducted of individual alternative components as well as of various combination of components. Nine policy options were developed for review and discussion by policy makers relative to the federal role in vocational education. (YLB)

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Findings of An Analysis of Alternative Federal Vocational Education Formulae

Prepared for 1981 Annual Meeting
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U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
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PURPOSE AND SCOPE OF THE STUDY

Broadly stated, the purpose of this study, conducted under contract to the Office of Vocational and Adult Education, U.S. Department of Education, was to examine current and alternate mechanisms for allotting federal vocational education funds to states and to provide decision makers with policy options for formula revision to be considered during reauthorization hearings. The basic formula for allotting federal vocational education funds to states has been in effect since 1963 (P.L. 88-210). Much federal education legislation has been passed since that date (Elementary and Secondary Education Act of 1965, Bilingual Education Act, Education for All Handicapped Children Act, to name just a few). A majority of federal education legislation passed after 1965 focused on providing categorical aid to populations determined to be in need of special federal assistance. Another major federal education policy issue in the late 1960's and early 1970's was the development of equitable funding mechanisms; that is, finance schemes that were sensitive to the varying fiscal capacities of states and local education agencies. These two major policy issues--addresing the educational needs of special populations and increasing equity of fund allocation mechanisms--were applied to our analysis of the allotment of federal vocational education funds. This analysis was not, however, conducted under the assumption that vocational education is just like any other federal education program. Rather, vocational education is unique among federal education programs in that it is intended to be available to <u>all</u> persons of working age (thus, to serve the general population of a certain age) and has been conceived as supplemental to state and local agencies' funding for services of their own choosing. (CBO, 1977, pp. 7-8).

The problem addressed in this study was to analyze the current funding formula and to develop alternate funding mechanisms which are: (1) equitable in terms of providing appropriate educational opportunities to special needs populations, (2) equitable relative to the varying levels of fiscal capacities among states, (3) sensitive to the differential costs of providing vocational education among states and (4) appropriately tuned to the unique intergovernmental relationships in

vocational education policymaking. States' needs for federal vocational education funds were defined to include these four dimensions of the study problem.

Prior to discussing the analysis framework and procedures, it is important to inform the reader about the limitations in study scope and methodology. First, there was no primary data collection effort for this study. Existing data bases were used to conduct the simulations of alternative formulae. Second, the contract did not provide a mechanism for generating a state-based definition of states' need for funds. The definition of states' relative needs for vocational educaton funds was based on the advice of the Technical Advisory Group for this study (see Appendix A), a review of the literature and informal telephone conversations with some state-level representatives. As a result, this definition was primarily oriented toward those national policy concerns which were perceived to transcend state boundaries and which were presumed to exhibit variation among the states. Third, this study was limited to a consideration of federal-to-state allocation of vocational education funds. NIE sponsored a concurrent study of the state-to-local distribution of vocational education funds; therefore, while pertinent information was exchanged throughout the conduct of the studies, the results of one could not be used to shape the analysis of the other. A future study could focus on an analysis of the interaction effects of the federal and state fund distribution patterns.

METHODOLOGY

The analysis framework for this study had two aspects: (1) the framework for conceptualizing formula development, and (2) a priori criteria to evaluate the potential efficiency and effectiveness of any given formula. The first aspect applied to the dimensions to be considered in developing a formula, and the second, to the considerations of formula adoption and implementation.

Formula Development Framework

Three major dimensions and one overriding policy issue were conceived to be important in developing a federal formula. The dimensions were:

(1) Need Factors--i.e., who needs the services for which funds are to be allocated?

(2) Allocation Mechanisms--i.e., should the formula be sensitive to the fiscal capacity and effort of subordinate units? and

(3) Expenditure Prescriptions--i.e., to what extent should the allocating agency prescribe how the funds should be spent by the recipient agencies?

To a large extent, the answers to these questions depend on a significant policy issue--what should be the role of the federal government relative to state and local governments? If, for example, the federal role in vocational education is viewed as providing supplementary aid to state education agencies for programs and services of their own choosing, the specification of need factors rests with the individual states. If, on the other hand, the appropriate federal role is viewed as allocating federal funds to national priority populations, then the specification of target populations rests with the federal government.

This issue also applies to the consideration of appropriate allocation methods. If the federal role is conceived as that of a partial equalizer of states' fiscal capacities, then equalization provisions would be incorporated into the federal formula. If federal funds are viewed as "incentives" to state/local expenditures, then the federal formula might include provisions to reward states making the greatest fiscal effort. In terms of expenditure prescriptions, the answer to this question is obviously related to the extent to which the federal government wishes to ensure that targeted populations are being served with federal funds. The approach to each of these dimensions can be seen as producing a range of policy choices, influenced first by the perception of the appropriate federal role and then by specific priorities in terms of populations served and methods for financing those services.

Table 1 illustrates a range of policy options along the three dimensions. This set of policy options guided our efforts to develop and test alternate formulae: that is, the ultimate outcome of this study was conceived to be a set of alternate formulae which addressed each point along the continuum displayed in Table 1. In this way, policymakers are presented with several formulae which illustrate states' allocations

TABLE 1: ILLUSTRATION OF VARIOUS POLICY OPTIONS FOR ALLOCATING FEDERAL VOCATIONAL EDUCATION FUNDS

FORMULA DEVELOPMENT DIMENSIONS	FEDERAL ROLE IN VOCATIONAL EDUCATION			
	SUPPLEMENTARY AID ONLY	SOME FEDERAL DEFINITON	GREATER FEDERAL DEFINITION	TOTALLY FEDERALLY TARGETED AID
NEED FACTORS	Federal funds to general population	Federal funds to population age groups or participating students	Federal funds to: -population age groups or participating students -unemployed	Federal funds to: -population age groups or participating students - special populations .. unemployed .. disadvantaged .. handicapped
ALLOCATION METHODS	No equalization or effort considered	Incentive for state effort included	Equalization and/or effort considered	Equalization and effort considered
EXPENDITURE PRESCRIPTION	No expenditure prescriptions	State plans to define expenditures; report on expenditures required	Expenditure prescribed to targeted groups	Expenditure prescribed to targeted groups as well as non-targeted groups (such as limited English-speaking)

under varying assumptions about the role in vocational education, incorporating various need factors and allocation methods. Although a formula per se does not prescribe expenditures, it is important, in constructing a formula, to consider the extent to which the legislation will elsewhere specify how allotted funds are to be expended. In other words, there may be important trade-offs for policymakers to consider in the specificity of the formula targeting versus expenditure prescription.

Evaluative Criteria

To assess the strengths and weaknesses of the current federal vocational education formula and to comparatively assess the potential effectiveness of alternate formulae in meeting states' needs for funds, it was essential to postulate criteria against which these formulae could be evaluated. These evaluative criteria are referred to as "a priori" because they were specified as part of the conceptual framework, prior to conducting any analyses. The criteria were based on the professional knowledge and experience of the study team, and represent a synthesis of viewpoints from scholarly works in the literature of public administration, public finance and public school finance. Similar expressions of criteria may be found in a variety of sources, including: Johns and Morphet, 1975; Gauerke and Childress, 1967; Barr, 1960; Mort, 1924, 1933; and the National Education Finance Project, 1970-75. It should be stated, however, that this specific set of criteria was conceived for this study; these precise criteria will not all be found in any one of the sources cited above. The bases for selecting these criteria were as follows: (1) they were adaptable for comparison across formulae; (2) they were definitive enough to allow judgments about the potential utility of a given formula, and (3) they incorporated the primary concerns of policymakers and those who are responsible for determining states' allocations based on a formula. The evaluative criteria used in this study were as follows:

- equity
- objectivity
- adequacy
- administrative efficiency
- flexibility

Depending on policy priorities, the study team believes a formula should have characteristics that allow all of these criteria to be met to some degree. Certain of the criteria generally operate in an inverse relationship, e.g., administrative efficiency and flexibility, although no two criteria are mutually exclusive. A brief discussion of each of the criteria follows.

Equity

In a broad sense, the concept of equity relates directly to the concept of financial equalization of educational opportunity. The subcomponents of equity are fiscal neutrality, standardization of fiscal effort and recognition of variation in educational needs/cost.

Fiscal Neutrality-- is the standard which ensures that a pupil's education is independent of the financial resources of his/her community or state and that the public has equal access to financial resources. An essential feature of fiscal neutrality is an appropriate measurement of relative fiscal abilities of governmental units. Some measures of fiscal ability are: per capita income, per pupil income, and equalized property values.

Standardization of Fiscal Effort--refers to the ratio of fiscal ability to fiscal support. Effort is frequently measured in standardized terms of tax rates per unit, proportion of revenues per unit devoted to the program in question, and/or a ratio of some measure of wealth or income per unit to expenditures.

Recognition of Variation in Educational Needs/Costs--is a component of equity insofar as greater educational costs are considered to "offset" fiscal ability. Certain educational programs (e.g., vocational education, special or exceptional education, etc.) are more expensive than the basic instructional program. Furthermore, special vocational programs (e.g., handicapped education) are generally more costly than regular vocational education programs. Costs can also vary by geographic location, such that major educational outlays, e.g., teacher salaries, are higher in some areas than in others.

Objectivity--is a standard which ensures that (a formula) is not subject to manipulation by the administering agency. Included in an objective formula are the prescribed data sources as well as the distribution technique to be utilized by the administering agency.

Adequacy--is a standard which ensures that the resources are sufficient to the purpose(s) of the program. For example, federal assistance may be designed for one or more of several purposes: (1) to provide an incentive to state/local investment (i.e., seed money or start-up costs, model development, etc.); (2) to build state/local capacity toward achieving a national objective; (3) to provide ongoing support for program operations; or (4) to fully fund special programs in the national interest (e.g., some forms of student financial aid). Adequacy must be evaluated in terms of the potential of the federal financial support for fulfilling its intended purposes.

Administrative Efficiency--refers to the degree of complexity involved in determining allocations. Although simple flat grants offer the advantage of administrative ease, the more complex the allocation mechanism, the more likely it is to be responsive to a variety of educational needs.

Flexibility of Application--refers to the ability of a formula to respond to varying educational needs resulting from demographic and economic factors unique to each state. Each state has developed a unique system of school finance of which federal assistance is usually a relatively small component. While there are many similarities among the states, there is enough variation in state aid formulae to necessitate consideration of the interface between the federal formula and intra-state concerns.

Table 2 shows the framework for applying these criteria in a comparative analysis of alternate formulae with the current formula.

Analysis Procedures

The primary steps to development of alternate formulae were as follows:

TABLE 2: FRAMEWORK FOR COMPARATIVE ANALYSIS OF ALTERNATE FORMULAE USING EVALUATIVE CRITERIA

EFFECT OF SUBSTITUTION RELATIVE TO CURRENT FORMULA

	INCREASED	NO EFFECT	DECREASED
Equity			
Fiscal Neutrality			
Fiscal Effort			
Variation in Educational Needs			
Objectivity			
Adequacy			
Administrative Efficiency			
Flexibility			

(1) identification of factors indicative of states' relative needs for vocational education funds;

(2) conversion of each factor into one or more variable measures;

(3) obtaining the appropriate data for each of the variable measures;

(4) duplication of the current formula with a computer program that matched the National Center for Education Statistics' calculations;

(5) design of a format for displaying the results of computer simulations of alternate formulae;

(6) determination of the appropriate substitution of variable measures into the current formula;

(7) test of alternate formulae; and

(8) evaluation of the potential utility of each alternate formula.

Each step is discussed briefly in the following section.

Identification of Factors Indicative of States' Relative Need

Various sources of information were consulted in developing a definition of states' needs for funds, including: the Technical Advisory Group, state and federal policymakers, demographic trend data, and a variety of technical and scholarly publications. Because the Technical Advisory Group represented a national rather than state-based perspective on defining need, other sources of information and opinion were sought. Informal telephone conversations were conducted with selected State Directors of Vocational Education to increase the representation of the state viewpoint. Interviews with policymakers in federal agencies and national associations were also conducted. In addition, significant trend data concerning current and projected population distributions, school enrollments and expenditures and employment statistics were compiled for use in this stage of the analysis.

Development of a definition of states' needs for vocational education funds was considered by the Technical Advisory Group. Because the specification of such a definition is highly dependent on the values of the persons making the determination, a procedure known as MAUT (Multi-Attribute Utility Theory) was used to document those decisions and to arrive at a panel consensus. The MAUT process utilizes a two-stage approach to policy formulation: first, the dimensions of value (in this

case, national priority areas for vocational education funding) are identified, and ranked according to their relative importance; and second, outcomes (need factors) are located along each dimension (Tittle, 1979, pp. 87-88). Table 3 shows the need factors that resulted from use of MAUT with the Technical Advisory Group.

Conversion of Need Factors into Variable Measures

This conversion of need factors into variable measures was accomplished by specifying the variable and then its relative expression. For example, unemployment was identified as a need factor. The appropriate variable could be number of unemployed persons, and its relative expression might be represented as number of persons in the state who are unemployed divided by the total state population, which would yield the percent of the state's population that is unemployed. Table 4 contains the variable measures which were derived from the need factors identified in the first step.

Obtain Appropriate Data for Variable Measures

The following criteria guided our search for appopriate data:

- The data should be available from a federal agency.
- The data should be recent enough to reflect current state characteristics.
- The data should be updated periodically.
- The data should be valid and reliable.

A number of measures were ultimately rejected due to the poor quality of available data.

Replication of Current Formula

The complete computer program used by NCES to calculate states' allotments was obtained and executed by Applied Management Sciences. The formula was simulated for fiscal year 1978, both with and without the hold harmless provision. The simulated formula without the hold harmless provision was used for comparison to alternate formulae, so that the true effect of the substituted factor(s) could be determined.

TABLE 3: NATIONAL PRIORITY AREAS AND THEIR IMPORTANCE AS RATED BY THE TECHNICAL ADVISORY GROUP

PRIORITY AREA	IMPORTANCE RANK	GROUP WEIGHT	CRITERION WEIGHT	MAUT WEIGHT
Access for general population	1	17.9	60	20
Access for needy population groups	2	15.0	50	17
Innovation, demonstration, dissemination, emerging programs, R & D	3	15.0	50	17
Quality programs	4	13.1	44	15
Incentives to private industry	5	9.6	32	11
Lifelong learning	6	7.1	24	8
States' ability-to-pay	7	5.0	17	6
Coordination and integration with other Federal programs	8	7.6	16	5
Economically depressed areas	9	2.9	10	3

TABLE 4: NEED FACTORS USED IN DEVELOPING ALTERNATE FORMULAE

1. Ability Measures

   a. State per capita tax base times national average property tax rate relative to the national average.

   b. State total taxing ability (from all tax sources) per capita relative to the national average.

   c. State per capita personal income relative to the national average.

2. Effort Measures

   a. State revenues for elementary and secondary education as a percent of state personal income, relative to the national average.

   b. State revenues for elementary and secondary education as a percent of state property tax collections, relative to the national average.

   c. State revenues for elementary and secondary education as a percent of state total tax ability (1b), relative to the national average.

   d. State vocational education expenditures per capita as a percent of state per capita personal income, relative to the national average.

3. General Population Measures

   a. State population as a percent of national population.

   b. Population age cohorts in the current formula, (with weights of 60, 20, 15 and 15) as a percent of national population in the respective cohorts, with new weights:

      - equal distribution
      - 40, 30, 20, 10
      - 30, 30, 30, 10
      - 37.5, 37.5, 25
      - 20, 50, 15, 15

4. Special Needs/Costs Measures

   a. State unemployment as a percent of national unemployment.

   b. The number of unemployed persons within state relative to total state population.

   c. State average teachers salary for all levels relative to the national average for all levels.

Design of Format for Displaying Results of Formulae Simulations

No single method of displaying the differences in states' allocations under the current formula and alternate formulae was considered adequate, so several indicators were developed: size of allocation under the current and alternate formula, percent and amount of changes in allocations, and changes in rank by size of allocation. Table 5 illustrates the format that was used to display simulation results.

Determination of Appropriate Substitutions of Variable Measures Into Current Formula

Most of the variable measures identified in a previous step were substituted for one of the factors in the current formula (either population or fiscal capacity). Others were added to the current formula as a set aside, and, in these cases, the total national allotment was arbitrarily split into two parts--80 percent to be distributed by the current formula and 20 percent to be distributed by a variable measure, such as incidence of handicapped population in the state. Other simulations were based on mathematical adjustments to certain parts of the formula, such as the weight assigned to population age groups, the constant used in the state allotment ratio and the upper and lower limits on the state allotment ratio. The exact substitutions made for each variable measure are discussed in the Findings Section of this paper.

Test Alternate Formula

A separate computer program was developed for each alternate formula. The results of each computer run were checked for logical consistency; that is, whether the expected array of states occurred.

Evaluate Potential Utility of Each Alternate Formula

A special form was devised to evaluate the potential utility of each alternate formula (see Table 6). Primary areas of concern in this evaluation were: (1) quality of the data; (2) characteristics of states that gained or lost funds under the alternate formula compared to the current formula; and (3) effect of the change to the current formula

TABLE 5: FORMAT FOR DISPLAYING RESULTS OF COMPUTER SIMULATIONS

TABLE #: (Name of Variable) Means is Substituted
Fiscal Year 1978 Allotment

State Name	Index (on Variable) Measure)	Current Formula	Alternate Formula	Percent Change	Amount Change	Rank According to Current Formula	Rank According to Alternate Formula	Change in Rank

TABLE 6: SAMPLE FORM FOR EVALUATING ALTERNATE FORMULAE

FACTOR #_____: _____

A. NATURE OF THE CHANGE:

1. Element Introduced into, or Changed in the Formula:

_____
_____
_____
_____
_____

2. Criteria Most Affected by this Change:

_____
_____

B. STRENGTHS AND WEAKNESSES OF THE FACTOR:

1. Characteristics of Data Used:

a. Timeliness (how recent): _____
_____

b. Availability (source, reliability): _____
_____

c. Periodicity (frequency of collection, compilation):
_____
_____

2. Validity of the Measure (how appropriately it measures the dimension):_____
_____
_____
_____
_____

3. Unity of the Formula (what effect does this factor have on other formula factors and vice versa?)_____
_____
_____
_____
_____

TABLE 6: (Continued)

4. Results (effect on states' allotment)

   a. Characteristics of states who gain (e.g., urban-rural, geographic region, industrial mix, population, wealth)

   b. Characteristics of states who lose:

   c. Extent of change to states' allotments:

      1. # of states gain by more than 5 (ranking) points

      2. # of states lose by more than 5 (ranking) points

      3. Total # gainer states

      4. Total # loser states

      5. Range of positive and negative changes:

TABLE 6: (Continued)

C. EFFECT OF SUBSTITUTION ON THE FORMULA

	INCREASED	NO EFFECT	DECREASED
Equity			
Fiscal Neutrality			
Fiscal Effort			
Variation in Educational Needs			
Objectivity			
Adequacy			
Adminis-trative Efficiency			
Flexibility			

D. For those criteria which are affected by this factor, give an explanation of how this effect occurs.

relative to the five evaluative criteria (equity, objectivity, administrative efficiency, adequacy and flexibility). The results of that evaluation determined the variable measures that were used to develop policy options for formula revision.

FINDINGS

The findings of the study are best discussed in relation to the following computer simulations:

Simulations Pertaining to Fiscal Capacity

A review of the literature revealed that several measures of fiscal capacity, including true valuation, personal income, net personal income, adjusted personal income, and comparative tax systems, have been either used or proposed for use in federal allocation formulae. In addition to personal income, which is used in the current VEA formula, true valuation and comparative tax systems were selected for extensive analysis and used in the computer simulations.

Personal income was selected due to its wide acceptance by economists and school finance specialists as a reliable and valid interstate measure of fiscal capacity. True valuation has been extensively used by states in distributing state revenues to local governmental agencies. Proponents of the true valuation measure contend that since the primary tax resource for local governmental agencies is the property tax, the most appropriate measure of fiscal capacity is the true valuation of property. The comparative tax system measure, although not a new concept, has been proposed recently as an alternative to the use of the personal income measure. Proponents of the comparative tax system suggest that it is more sensitive to the variation of fiscal capacity which exists among the states. Since the personal income measure of fiscal capacity is used in the current allocation formulae, all computer simulations were contrasted with allocations made through the use of the personal income measure.

There was no noticeable pattern in the redistribution of revenues to the states based on either geographical area or fiscal capacity (personal income per capita). Similarly, the substitution of the comparative tax system measure in lieu of personal income did not show an identifiable pattern of states which were advantaged or disadvantaged.

Although the use of personal income per capita as a measure of fiscal capacity in the allocation of federal revenues is not without its critics, its advantages when contrasted with alternative measures are apparent. It is easily obtained and commonly accepted and understood as a measure of fiscal capacity. True valuation per capita, on the other hand, is suspect due to the great variation in assessment practices among the states and has been criticized as a device which measures accumulated wealth rather than tax capacity. The comparative tax system measure is not widely understood or accepted. While the original data are obtained from governmental sources, actual calculations and interpretations needed prior to inclusion in an allocation formula are currently made by private researchers.

Simulations Pertaining to Fiscal Effort

The concept of fiscal effort, such as comparing the performance of taxes among states and/or the degree of utilization of available tax resources may be viewed in various ways. The most commonly-used measure of fiscal capacity, however, involves a ratio of tax revenues or expenditures to a predetermined measure of fiscal capacity, in the following general form:

$$\text{Tax Effort} = \frac{\text{tax revenues or expenditures}}{\text{fiscal capacity}}$$

The following five measures of fiscal effort were substituted in the current formula in lieu of the personal income per capita fiscal capacity measure: (1) Education Revenues ÷ Personal Income, (2) Education

Revenues ÷ Comparative Tax Ability, (3) Vocational Education Expenditures ÷ Personal Income, (4) Vocational Education Expenditures ÷ Comparative Tax Ability, and (5) Education Revenues ÷ Property Tax Collections.

The substitution of Education Revenues ÷ Personal Revenue did not result in a consistent pattern regarding the variance of the state's tax effort by geographical area, fiscal capacity, and size of the state. Nevertheless, the largest gains were registered by three states high in fiscal capacity: Alaska, Hawaii, and Delaware.

The use of Education Revenues ÷ Comparative Tax Ability resulted in a pattern of advantaged states in the Mideast and Far West. Disadvantaged states tended to be located in the Plains, Southeast, and New England. An overall reduction in the current level of fiscal neutrality was evident.

When Vocational Education Expenditures ÷ Property Tax Collections was substituted for personal income per capita, it resulted in a pattern of advantaged states in the Mideast and Southwest. Overall, the more fiscally-able and larger states reserved larger allotments through the use of this substitution than through the current formula.

After careful analysis, it was determined that the lack of available accurate data (particularly the property valuation, comparative tax system data, and reliable vocational education expenditures) rendered all alternative tax effort measures unacceptable. The use of personal revenue as an effort measure, although acceptable as reliable and valid measure of fiscal capacity, tended to favor states high in fiscal capacity, thus reducing the current level of fiscal neutrality.

Simulations Relating to Variations in Educational Needs/Costs

As a component of the broadly-defined concept of equity, variations in educational needs/costs were considered in the simulations of alternate formulae. It is important to note that the 1976 Amendments to the Vocational Education Act (VEA), require states to "set aside" stipulated portions of their basic grants for the excess costs of

educating handicapped and disadvantaged pupils. In addition, the legislation prescribes states' expenditures rather than the allocation procedure. In the assignment of weights to the several population age groups, the formula rather crudely accounts for variation in educational needs. The following alternatives to the current system of accounting for variations in educational needs/costs were considered: (1) Client Costs by Vocational Education Program, (2) Handicapped and Disadvantaged Clients, (3) Unemployment, (4) Teacher Salaries as Proxy for Cost-of-Education Index, and (5) Adjustments to Existing Age-Group Weightings.

While it was possible, in most cases, to identify state and federal vocational education revenues to LEAs, it is more difficult to determine accurately the amount of local revenues to support vocational education. Therefore, vocational education revenues, total revenues, and/or expenditures for vocational education (or program) were determined to be nonreliable and inappropriate for use in a federal allocation formula. When the Vocational Education Data System (VEDS) is fully operational such data should be accessible and this alternative given further consideration.

The handicapped and disadvantaged simulation illustrates distribution when the incidence of states' special needs populations was added to the formula as a 20 percent set aside while the remaining 80 percent was distributed in accordance with the current formula. There were no noticeable patterns present as the simulation resulted in states' benefitting and losing in all quartiles of personal income, geographical location, population size, and population density. However, this simulation does result in increased equity due to its flexibility in responding to varying needs. On the other hand, an additional series of computations are necessary which is added to an existing complex allocation formula.

Similar to the above simulation, the unemployment simulation indicates how funds would be distributed if an index of state to national unemployment were used to allocate 20 percent of available funds. The

remaining 80 percent was distributed in accordance with the current formula. States in the Mideast and Far West geographical areas tended to gain under this alternative, as did the fiscally-able and larger states. This simulation resulted in greater ability to respond to educational needs (as measured by unemployment) but resulted in a lower level of fiscal neutrality. Also, as noted in the simulation of the incidence of handicapped and disadvantaged, additional calculations are necessary, thus reducing the level of administrative efficiency which exists in the current formula.

Teacher salaries for elementary, secondary, and postsecondary education were used as a proxy for the cost-of-education index and substituted in the current formula in an inverse manner to the current measure of fiscal capacity. This substitution resulted in a dramatic decrease in the level of fiscal neutrality which exists under the current formula. States in the Mideast and Far West geographical areas generally benefitted by this alternative, as did states in the first quartile of fiscal capacity and size. It should be noted that there is no general agreement among school finance specialists regarding the use of cost-of-education indices. The current state-of-the-art has not yielded an index that distinguishes between uncontrolled costs due to geographical location and controllable costs reflective of citizens' choices relative to the desired standard of living and fiscal capacity.

A series of relatively minor adjustments to the age-group weightings of the current formula were conducted, which in varying degrees, placed greater emphasis on the older age groups. At the present time, states do not evidence great variation in the sizes of these age groups, as the changed weights produced only minor adjustments to most states' allotments under the current formula. The largest reallocation of funds occurred when the allotments were based on the size of the state's total population. The retention of the age groups in the formula, while contributing to the current formula's complexity, does result in allotments that are more closely based on state's needs for vocational education funds.

Simulations of Mathematical Changes to the Existing Formula

Various mathematical components of the current VEA formula are subject to modification. Simulations were conducted in which the following mathematical components were altered: (1) The Hold Harmless Provision; (2) The State Allotment Ratio (SAR) limits; and (3) The Constant.

As stated earlier, the 1976 Amendments require each state's allotment under the existing formula to be held harmless to the amount received in FY '76. However, a decision was made to run all simulations using the current formula without hold harmless in order that a true mathematical comparison could be made and the actual effects of changes to the formula more easily determined.

The current formula imposes limits of .4 (for the high fiscal capacity states) and .6 (for the low fiscal capacity states) on the value of the SAR for any state; thus the fiscal-equalizing component of the formula is somewhat restrained. However, because of the narrowing trend in the variance of per capita income among the states, the SAR limits are now nearly inoperative. When the upper limit of .6 was raised to .7, the reallocation of funds was negligible for most states with only three low fiscal capacity states receiving significant additional revenues. Obviously the importance of the upper limit at .6 negatively affects a small number of low fiscal capacity states. The complete removal of the SAR limits produced only one significant change over the previous simulation, which raised the SAR limits. One high fiscal capacity state and the District of Columbia lost significant revenues while the same three low fiscal capacity states obtained slightly greater revenues.

The constant acts as an adjustment for the state's per capita income in determining the relative portion of the total allotment each state will receive. When set at .5 (in accordance with current formula), the constant has the effect of distributing a slightly smaller share of the total allotment to states with greater fiscal capacity than would be the case if the constant were absent. When the constant was changed from .5

to .4 and the SAR limits appropriately adjusted, significant changes occurred in the states' allotments. As expected, the low fiscal capacity states received less revenues while the high fiscal capacity states gained revenues. Conversely, when the constant was changed from .5 to .6 and the SAR limits were appropriately adjusted, even more substantial changes in the states' allotments occurred. Three high fiscal capacity states lost more than 10 percent of their current allotment while several low fiscal capacity states profited by 5 percent or more.

Simulations Based on Combinations of Previously Discussed Components

In addition to individual simulations of alternative components of the vocational education formula, including fiscal capacity, fiscal effort, variations in educational needs/costs, and certain adjustments to existing mathematical components, various combinations of components were simulated for illustrative purposes. While many combinations were considered in the conduct of the study, the following nine combination simulations warrant discussion.

Combination 1: General Population and Personal Income Effort Index

In this simulation, 80 percent of the VEA appropriation was multiplied by a state's general population (state population as a percent of national population) and by the current state allotment ratio. The remaining 20 percent of the funds was distributed by a fiscal effort measure. This measure was calculated by determining the portion of each state's personal income used to generate its state/local elementary and secondary education revenues.

The interaction of the general population and personal income fiscal effort factors and removal of the SAR limits appeared to achieve a higher degree of fiscal neutrality than the current formula. However, the use of general population rather than weighted age groups reduces the consideration given to variance in educational needs and detracts from the formula's flexibility, while improving administrative efficiency.

Combination 2: Weighted Population and Personal Income Effort

For this simulation, 80 percent of the VEA appropriation was determined by the current formula and the remaining 20 percent, by the same fiscal effort measure used in the previous combination. The only difference between Combinations 1 and 2, then, is in the use of weighted rather than general populations.

The same advantages and disadvantages discussed relative to Combination 1 apply to this combination. Greater formula flexibility is introduced with the use of weighted population age groups rather than general population.

Combination 3: Weighted Population and Comparative Tax Effort/Education Revenues

Eighty percent of the VEA appropriation was allocated based on the current formula and 20 percent on fiscal effort determined by the portion of a state's total tax ability used to generate education revenues.

The characteristics of states benefitting under this formula are similar to those for Combination 2. The fact that the differences in results for Combinations 2 and 3 were minor, indicates that the use of either personal income or comparative tax ability would yield similar results. Other advantages and disadvantages of this type of formula are those discussed relative to Combinations 1 and 2.

Combination 4: Weighted Population and Comparative Tax Effort/Vocational Education Expenditures

The current formula is used to allocate 80 percent of available funds, and the remaining 20 percent is allocated based on a measure of fiscal effort. This fiscal effort measure was calculated by determining the proportion of each state's total taxing capacity devoted to vocational education expenditures.

Although the overall results of this combination are similar to those shown for the preceding combinations, the allotments of some states

appear to be more affected by the use of vocational education expenditures rather than education revenues in the effort index. States in the New England, Plains, Southwest, Rocky Mountains and Far West regions gained under this simulation; while the Great Lakes region was clearly disadvantaged. There was no strong relationship between rank on fiscal capacity and size of allotment change. The smaller states and less dense states, in general, benefitted.

Combination 5: Weighted Population, Ability and Comparative Effort

This combination demonstrates how funds would be distributed if a comparative ability measure were substituted in the formula for the current personal income ability measure, and if a 20 percent set-aside for comparative effort were applied. This represents an attempt to use comparable measures of ability and effort in combination. The states of the Northeast, Plains, Southwest and Rocky Mountain regions benefitted from this type of formula, as did the more fiscally-able states, the less dense and the smaller states.

This simulation did not appear to increase the fiscal neutrality of the current formula. Furthermore, the validity of the effort index is somewhat questionable, as discussed in a previous section.

Combination 6: Reapply SAR limits to Combination 5

This formula was identical to that used in Combination 5 except that the SAR limits were reapplied to the fiscal capacity index in the formula. As previously discussed, the SAR limits applied to personal income as a measure of fiscal capacity does not have much affect on states' allotments. This is due to the small variation across states on this measure. A further test of the effect of the SAR limits was conducted, using a more variable measure of fiscal capacity--comparative tax ability. This simulation is additional proof that the SAR limits affect only a few states' allocations under the current formula. The differences in results of Combinations 5 and 6 are minor. Like Combination 5, this simulation resulted in a reduction of the degree of fiscal neutrality provided in the current formula.

Combination 7: General Population

This formula was simulated to demonstrate the effects of less prescription than is contained in the current formula. For this simulation, states' allotments were based entirely on the size of the state's population relative to the national population. No fiscal equalizing component was included.

This change resulted in fairly large changes to many states' allotments. The larger, higher fiscal capacity and more densely-populated states benefitted from this type of formula. Obviously, the degree of equity provided in the current formula is reduced, both in terms of fiscal neutrality and recognition of variation in education needs.

Combination 8: Weighted Population

The underlying principle for this combination is similar to that for Combination 7, but the weighted population age groups in the current formula are used rather than the size of the state's total population, to allocate funds. This formula is also the same as the current formula without the state allotment ratio.

As was expected, the results are similar to those for Combination 7, in terms of characteristics of states who benefit from this formula, although the effect is less pronounced.

Combination 9: Special Needs Populations, Ability and Effort

This combination was included to illustrate a large degree of prescription in a formula. Federal funds are totally targeted to national priority concerns--serving special needs populations, fiscal equalization and stimulating fiscal effort. The VEA appropriation was split into 80 percent and 20 percent portions. Eighty percent of the funds were allocated based on special needs populations and the current state allotment ratio; the remaining 20 percent were allocated based on a measure of fiscal effort.

This formula resulted in substantial changes to states' allotments. States in the Southeast, Southwest and Rocky Mountain regions tended to benefit, as did states with relatively low fiscal capacities. Larger states also tended to lose funds under this formula.

The special needs population data used in this simulation are unpublished, and may not be periodically updated. The future availability of such data is unknown. This combination does increase the equity of the formula, in terms of variation in educational needs and standardization of fiscal effort. However, it represents a view of the federal role in vocational education as one in which funds are allocated solely to federal priorities.

POLICY OPTIONS

This study concluded with the development of policy options in a concise form for review and discussion by interested policymakers. These options represent a range of choices relative to the federal role in vocational education; most are not mutually exclusive, i.e., option 4 can be combined with option 5, for example, to produce a new option. For ease of understanding, and to isolate the effects of any given changes to the current formula, no combinations of changes were presented as policy options. Although numerous combinations were simulated, it was ED's decision not to present these as policy options until policymakers decided on the nature of more basic changes to the current formula.

Following is a brief presentation of each of the policy options.

OPTION 1: RETAIN CURRENT FORMULA IN ITS PRESENT FORM

RATIONALE: The current formula distributes funds on the size of each states' working-age population and, in a limited manner, adjusts states' allotments based on relative fiscal capacities. There does not seem to be a lot of dissatisfaction with the current formula.

IMPLICATIONS: The formula does not target funds to special needs populations nor to areas of high unemployment. The limits placed on the state allotment ratio restrain the degree of fiscal equalization accomplished by the formula. The hold harmless provision also curtails the effect of the population age groups and per capita income in determining each state's allotment.

OPTION 2: DISTRIBUTE FUNDS BASED ON GENERAL POPULATION ONLY

RATIONALE: It could be argued that federal funds for vocational education should only be used to supplement state and local program expenditures, since federal funds account for only 9 percent, on the average, of all funds expended within a state for vocational education. In this case, the formula would be based on the size of the state's population.

RESULTS: States' allotments are significantly different than under the current formula. The more fiscally-able and larger states tend to benefit under this type of formula. Distribution of federal funds is, in effect, accomplished through a flat grant; no attempt is made to account for varying needs of states, or for variations in states' fiscal capacities or effort.

TOTAL REALLOCATED DOLLARS: $29,916,254

OPTION 3: DISTRIBUTE FUNDS BASED ON WEIGHTED POPULATION AGE GROUPS ONLY

RATIONALE: The argument is the same as that made for option 2, except that funds are allocated only to those age groups that could participate in vocational education programs. The fiscal-equalizing provision is not included.

RESULTS: This type of formula would be categorized as a variable flat grant, because funds are allocated based on a unit of need, and those units receive different weights in the calculations of a state's allotment. The removal of the fiscal-equalizing provision from the current formula does have a substantial effect on many states' allotments. The more fiscally-able and larger states tend to benefit from this type of formula, although to a smaller degree than under option 2.

TOTAL REALLOCATED DOLLARS: $25,258,249

OPTION 4: CHANGE THE POPULATION WEIGHTS IN THE CURRENT FORMULA TO REFLECT A NEW EMPHASIS ON THE POSTSECONDARY LEVEL.

RATIONALE: Enrollments at the secondary level will be dropping through the 1980s. Postsecondary institutions are a point of occupational retraining for many nontraditional students (older women, persons seeking new or updated job skills, minorities, etc.). The average age of the student in postsecondary institutions is increasing.

IMPLICATIONS: The vocational education delivery system has traditionally focused on the secondary level; youth unemployment promises to become an even larger problem. Some policymakers also believe that focusing vocational education efforts on the secondary level has the greatest rate-of-return.

RESULTS: This change to the current formula does not result in a greatly reduced allocation for any state. Many relatively small states would lose a small portion of their current allotment. Two states would increase their current allotment by more than 5 percent--Alaska and Hawaii--and the District of Columbia.

TOTAL REALLOCATED DOLLARS: $3,918,269

OPTION 5: REMOVE THE STATE ALLOTMENT RATIO LIMITS FROM THE CURRENT FORMULA

RATIONALE: The current formula places limits on the value of a state's allotment ratio (SAR) which is calculated based on the per capita personal income of a state relative to the national average. The formula is not, therefore, as fiscally-equalizing as it would be without such limits.

RESULTS: When the SAR limits are removed, only five states' allotments are meaningfully affected. Alaska, the state with the highest level of personal income, would lose over 25 percent of its current allotment; the District of Columbia would lose less than 3 percent. Three states would receive a slightly larger allotment--Mississippi, Arkansas, and Alabama.

TOTAL REALLOCATED DOLLARS: $959,738

OPTION 6: CHANGE THE CONSTANT IN THE CURRENT FORMULA.

RATIONALE: The constant is used as a multiplier in the calculation of the state allotment ratio (SAR); it has a fiscal-equalizing effect. The equalizing effect of the formula is increased as the constant is increased.

RESULTS: Raising the constant from .5 to .6 has a substantially greater fiscal-equalizing effect than removal of the SAR limits. All of the states who rank in the first quartile on personal income would lose a portion of their current allocation; conversely, all states in the fourth quartile would increase their current allotment by at least 5 percent.

TOTAL REALLOCATED DOLLARS: $12,715,934

OPTION 7: TARGET A PORTION OF FEDERAL FUNDS TO AREAS OF HIGH UNEMPLOYMENT

RATIONALE: Some policymakers believe that vocational education is at least a partial solution to problems of unemployment. Incorporating an unemployment index into the allocation procedure implies that federal funds should be targeted to national priorities and that unemployment is a national concern that can be appropriately addressed through expanding vocational education programs.

RESULTS: If 20 percent of the total available funds are distributed based on a state's pecentage of the nation's unemployed population, significant changes in states' allotments would result. Three states--Alaska, South Dakota and Nebraska--would lose more than ten percent of their current allotments; two states--Alabama and New Jersey--would experience an increase of more than ten percent to their current allotments. The characteristics of states that would gain under this type of formula are varied according to rankings on personal income, population size, and population density.

TOTAL REALLOCATED DOLLARS: $15,085,071

OPTION 8: TARGET A PORTION OF FEDERAL FUNDS TO STATES WITH HIGH INCIDENCES OF HANDICAPPED AND DISADVANTAGED STUDENTS

RATIONALE: The 1976 Amendments required states to spend a portion of their basic grants on handicapped and disadvantaged students. These national priorities could be handled by formula targeting rather than expenditure prescriptions; furthermore, if the federal government wanted to ensure that funds are spent on students who generate such funds, both formula targeting and expenditure prescriptions could be used.

RESULTS: If 20 percent of available funds are targeted based on a state's percentage of handicapped and disadvantaged students relative to the national total, significant changes in states' allotments would result. States in all geographic regions, of various population sizes and degrees of fiscal capacity would benefit from this type of formula change. The largest gains would be made by South Carolina, Arizona, Oklahoma and Louisiana. Only one state, New Hampshire, would lose more than ten percent of its current allotment.

TOTAL REALLOCATED DOLLARS: $11,873,429

OPTION 9: CONSTRUCT A FORMULA WHICH IS BASED ON UNIT COST OF VOCATIONAL EDUCATION

EXPLANATION: It would be possible to construct a federal vocational education formula which is based on the cost of providing vocational education on a unit (student) basis, rather than determining the amount of a state's allotment by size of population age cohorts and fiscal capacity. A unit cost formula would base each state's allotment on the number of

students served or number of eligible persons in the state's population times a dollar amount, indicating the cost of vocational education.

RATIONALE: This method of determining states' allotments is similar to the approach to education aid used by many states as well as in P.L. 94-142, the Education of all Handicapped Children Act. It would allow national appropriations for vocational education to be based on an objective measure of need for funds and would facilitate the process of developing budget justifications. It would also simplify the procedures for calculating states' allotments.

RESULTS: This type of formula was not simulated because it would involve deriving reliable cost estimates for the provision of vocational education services which was beyond the scope of this study. Furthermore, all simulations were run on a fixed national appropriation for vocational education.

USES OF STUDY FINDINGS

The study was conducted to provide information to policymakers about the strengths and weaknesses of the current federal vocational education funding formula for use in reauthorization hearings. It is our understanding that if vocational education is not included in the Administration's education block grant proposal, then the findings and policy options will be used for the purpose they were intended. Obviously, if vocational education becomes part of a block grant funding mechanism, the concept of a federal vocational education funding formula will be obsolete.

The authors believe, however, that the methodology for this study could be wholly or partially replicated for analysis of any federal funding effort. We do recommend, however, that if other similar studies are conducted, two additional procedures/analyses be considered--the need to collect state-based data to develop a definition of states' needs, and the need to consider the alternative effects of federal to state and state to local funding mechanisms. Although these recommendations were made, funds were not available for their inclusion in this study.

APPENDIX A

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